

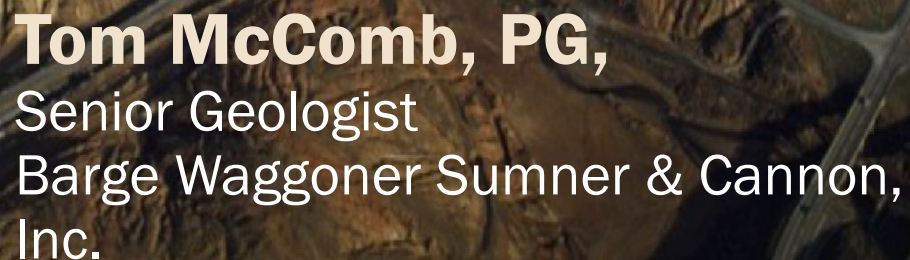




BWSC | BARGE
WAGGONER
SUMNER &
CANNON, INC.



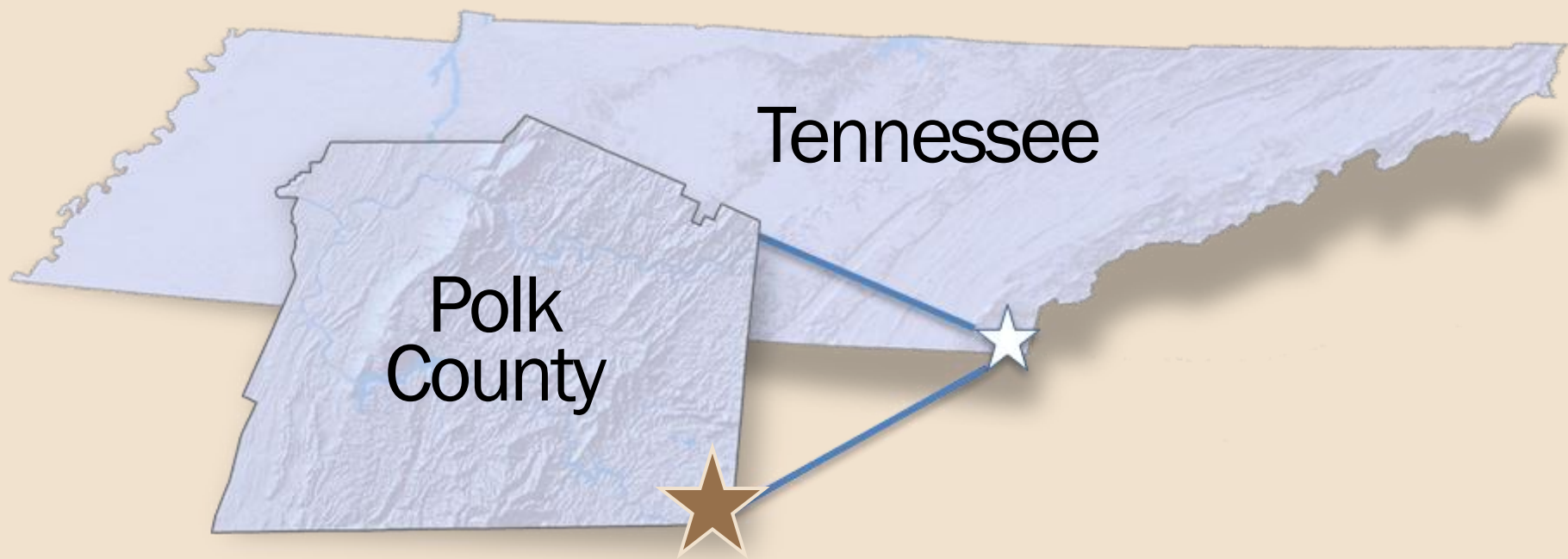
Reclamation of the North Potato Creek Watershed, Copperhill Tennessee



Tom McComb, PG,
Senior Geologist
Barge Waggoner Sumner & Cannon,
Inc.



Dave Turner
Environmental Specialist
TDEC – Division of Water Resources
Mining Section



Tennessee

Polk
County

North Potato
Creek Watershed

4,000 acres

Thirteen mines

Two main streams

- North Potato Creek
- Burra Burra Creek

Discharges to the
Ocoee River



SITE OVERVIEW

Vegetation on the site was previously denuded and the landscape severely eroded forming broad braded streams

SITE OVERVIEW

Mining waste located in and along stream channels through the watershed

SITE OVERVIEW

Mine waste was a source of metals loading and acidity to the surface water

SITE OVERVIEW

Poor water quality and poor habitat depressed the aquatic macroinvertebrate communities in the streams

SUCCESSFUL STRATEGY

Team Approach

Aquatic Macroinvertebrate Goals

Adaptive Management

Project Approach:

TN Department of
Environment &
Conservation

TEAM APPROACH





Project Approach:

**ACQUATIC
MACROINVERTEBRATE
REMEDIAL GOALS**

During the development of the consent order, EPA, TDEC, and GSH identified the complexity of the site, and decided to use the restoration of aquatic macroinvertebrate communities as the remedial goal for the site.

Project Approach:

ADAPTIVE MANAGEMENT

structured
iterative

reduce uncertainty

system monitoring

The agreement did not prescribe a specific remedy or an explicit timetable for completion, allowing for the use of adaptive management for the implementation of the project.

BACKGROUND

BACKGROUND





Boyd Mine

14th Level

050

North Potato Creek Watershed – 1950s



PHASES OF REMEDIATION

Initial Actions:

Elimination of potential
human health exposures

Secondary Actions:

Large removal actions
in acid-generating
source areas

Tertiary Actions:

Small removal actions of sources of acid generation and metals and the reconstruction of impacted stream reaches

Final Actions:

Improvement of stream and
stream bank habitats

INITIAL ACTIONS

Removal of PCB contaminated materials

Capping former Lead Contact Acid
Plant Site

Capping Isabella Srag Area
INITIAL ACTIONS

Removal of asbestos from structures

Engineered controls Installed around
mine shafts and subsidence areas

Treatment of NPC at the South Mine Pit





Isabella Contact Lead
Acid Plant

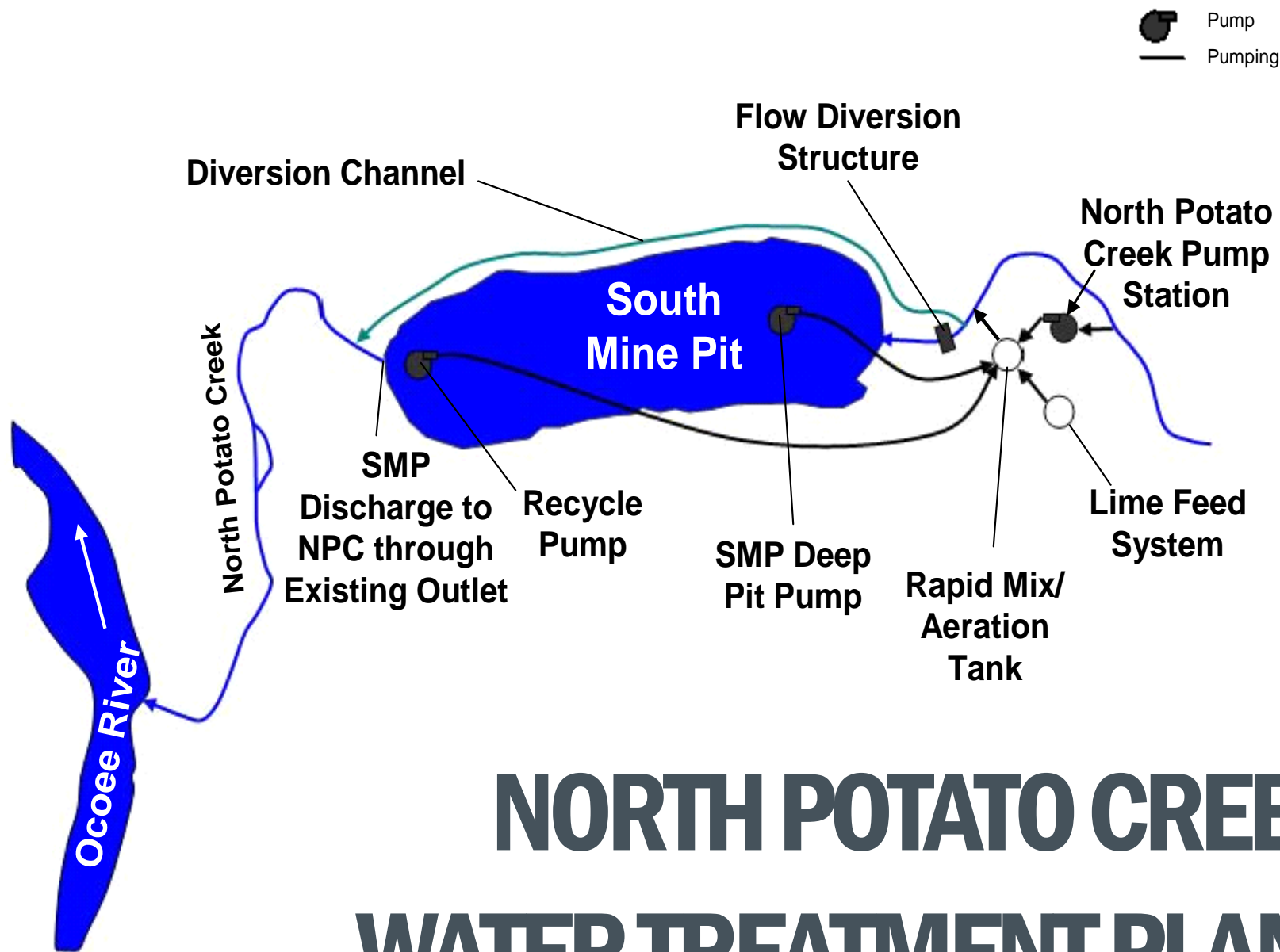




NORTH POTATO CREEK WATER TREATMENT PLANT

Began January 10, 2005

Removes 681 lbs.
dissolved metals daily



NORTH POTATO CREEK WATER TREATMENT PLANT

**Lime Feed
System**

**Rapid Mix/
Aeration Tank**

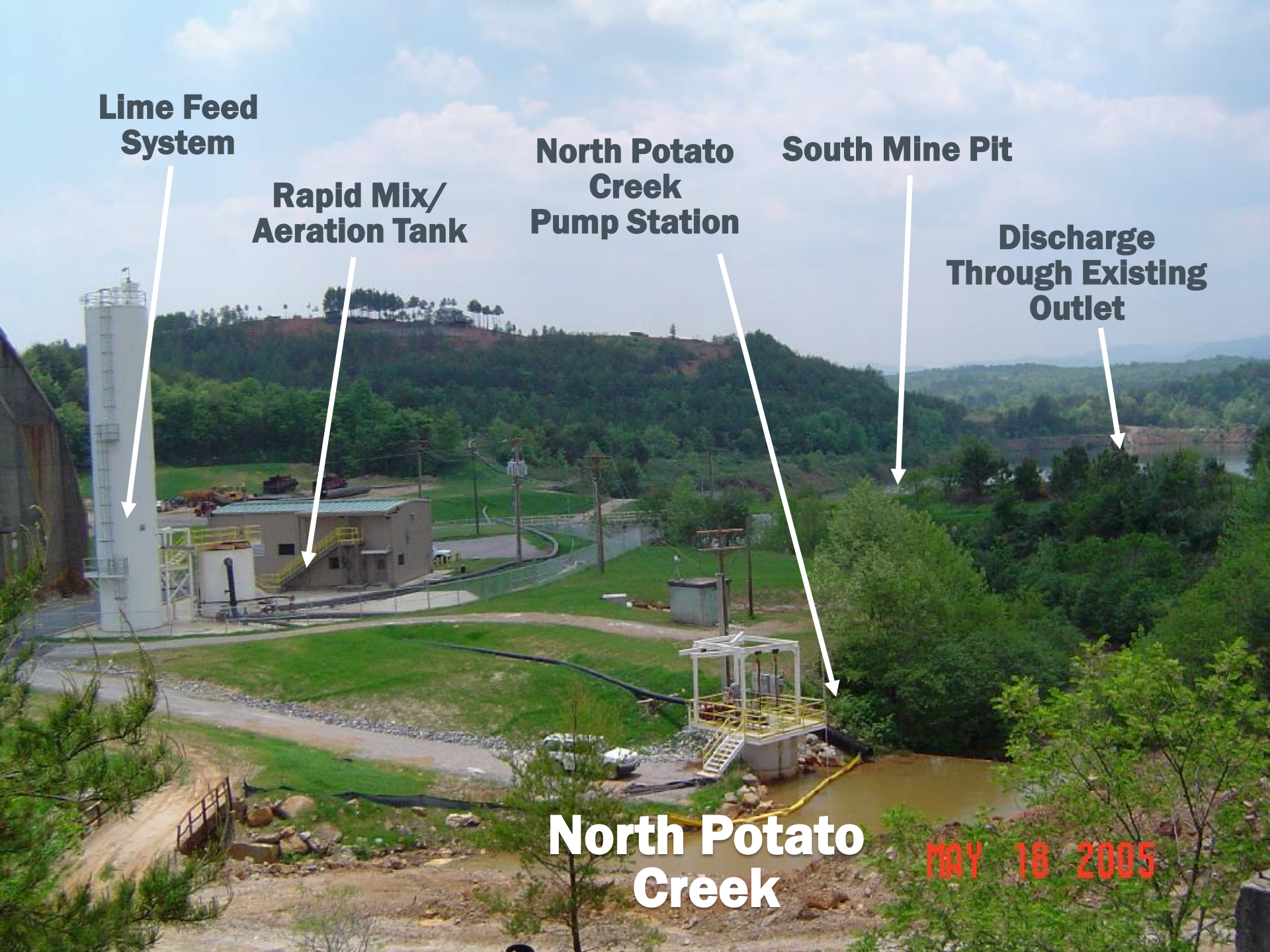
**North Potato
Creek
Pump Station**

South Mine Pit

**Discharge
Through Existing
Outlet**

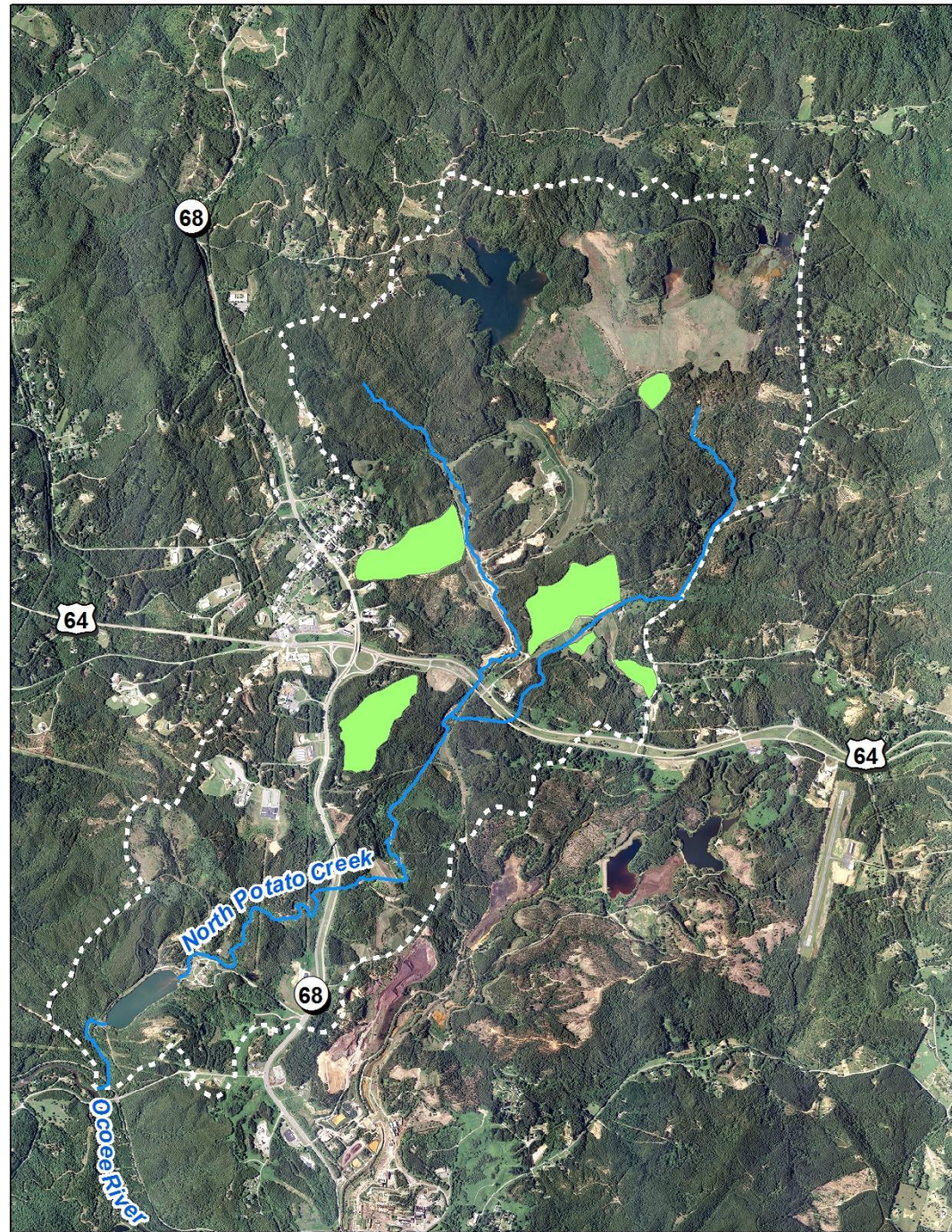
**North Potato
Creek**

MAY 18 2005



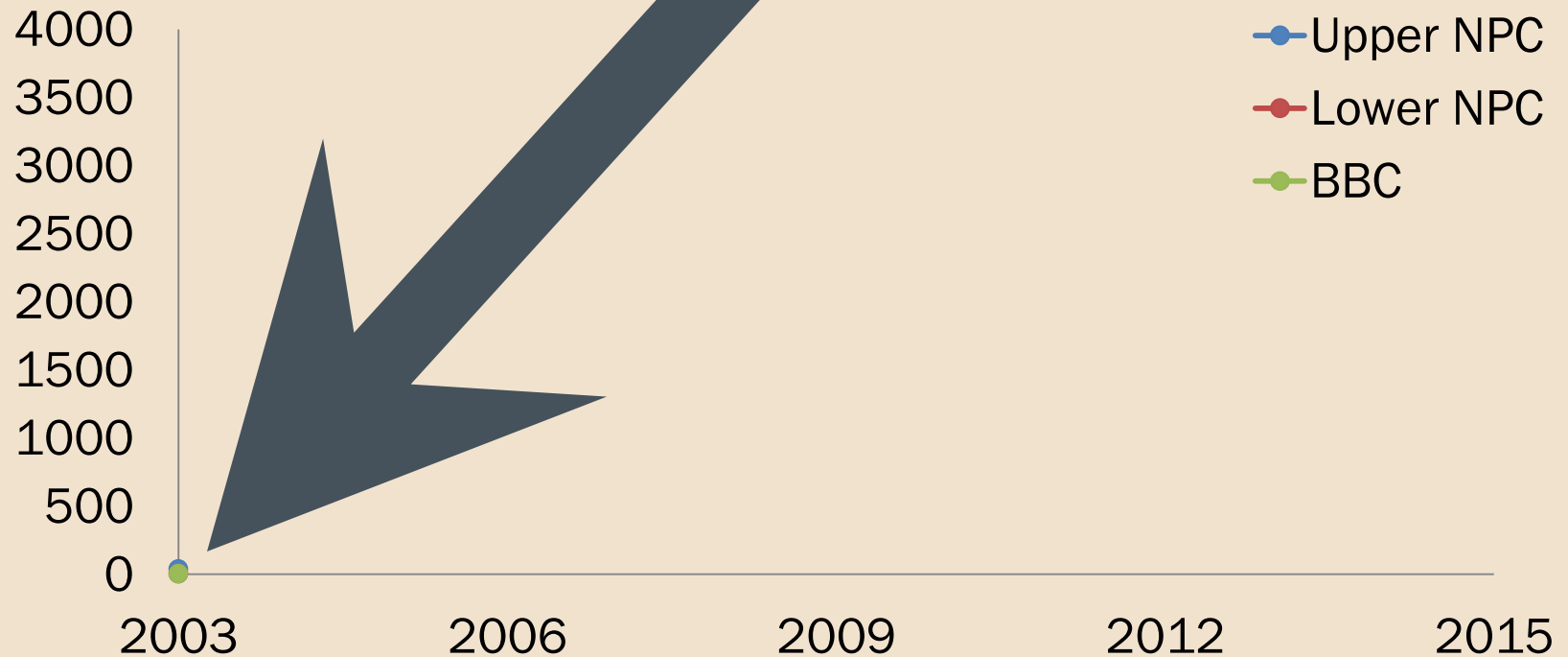
Legend

 Initial Actions



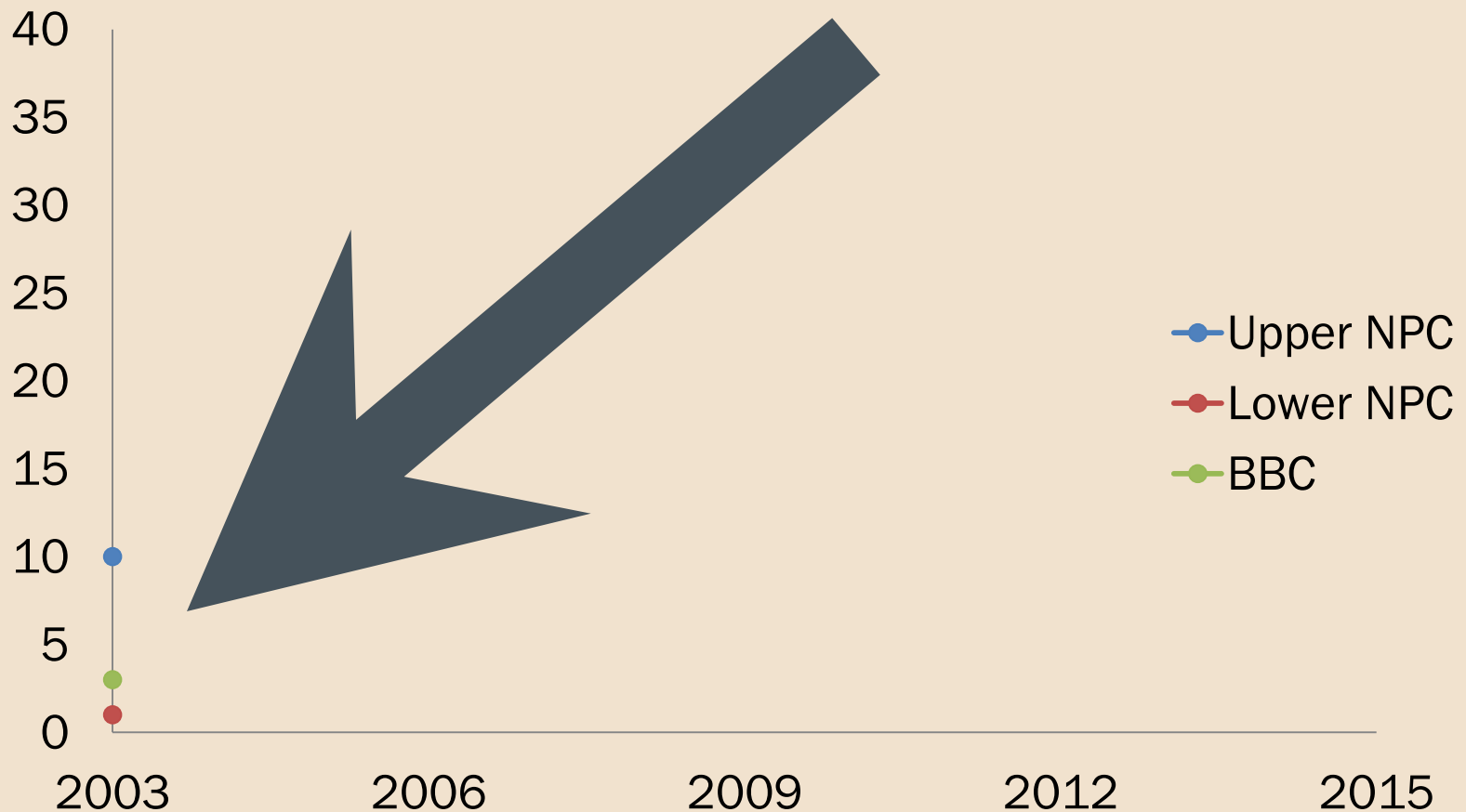
TOTAL ABUNDANCE 2003

Biological Results Initiation of Biomonitoring



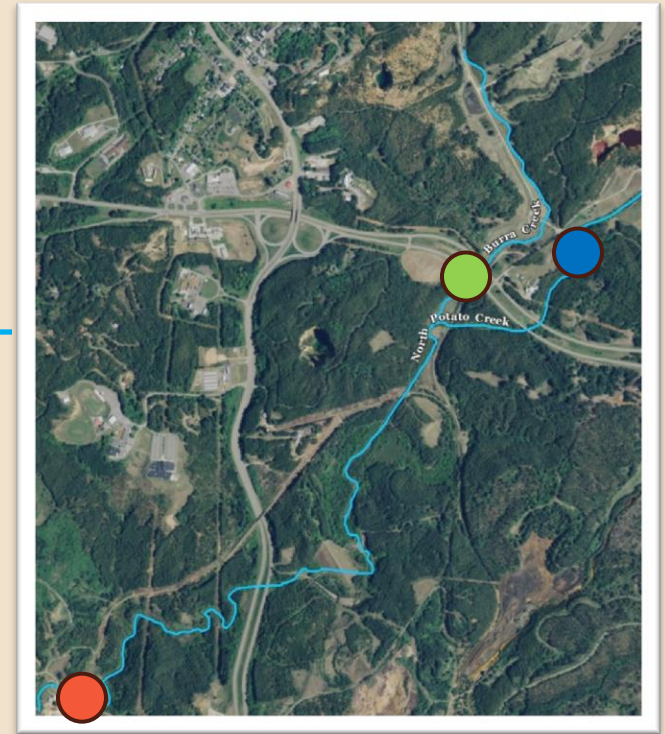
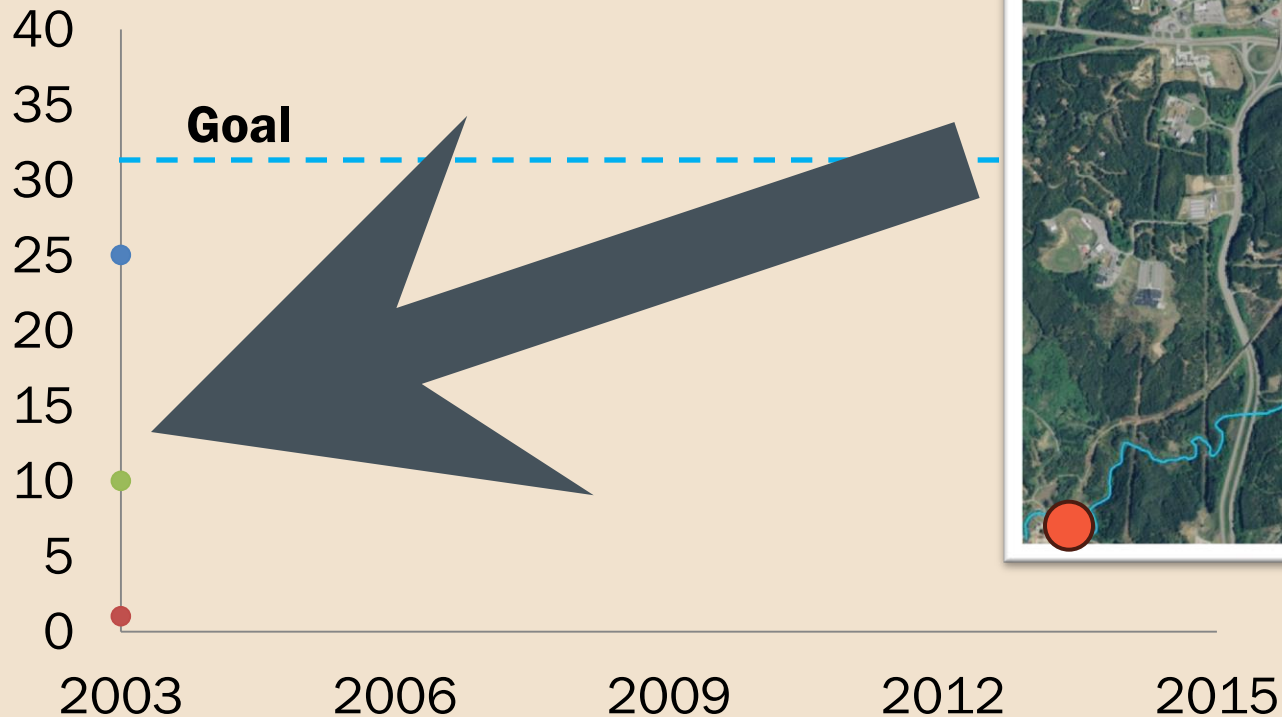
TAXA RICHNESS 2003

Biological Results Initiation of Biomonitoring



TMI SCORE 2003

Biological Results Initiation of Biomonitoring



SECONDARY ACTIONS

Large removal of acid-
generating materials

WASTE REMOVAL AND CAPPING

London Mill Area

Isabella Plant Site

Mary Mine Area

Eureka Roast Yard

Buena Vista Roast Yard

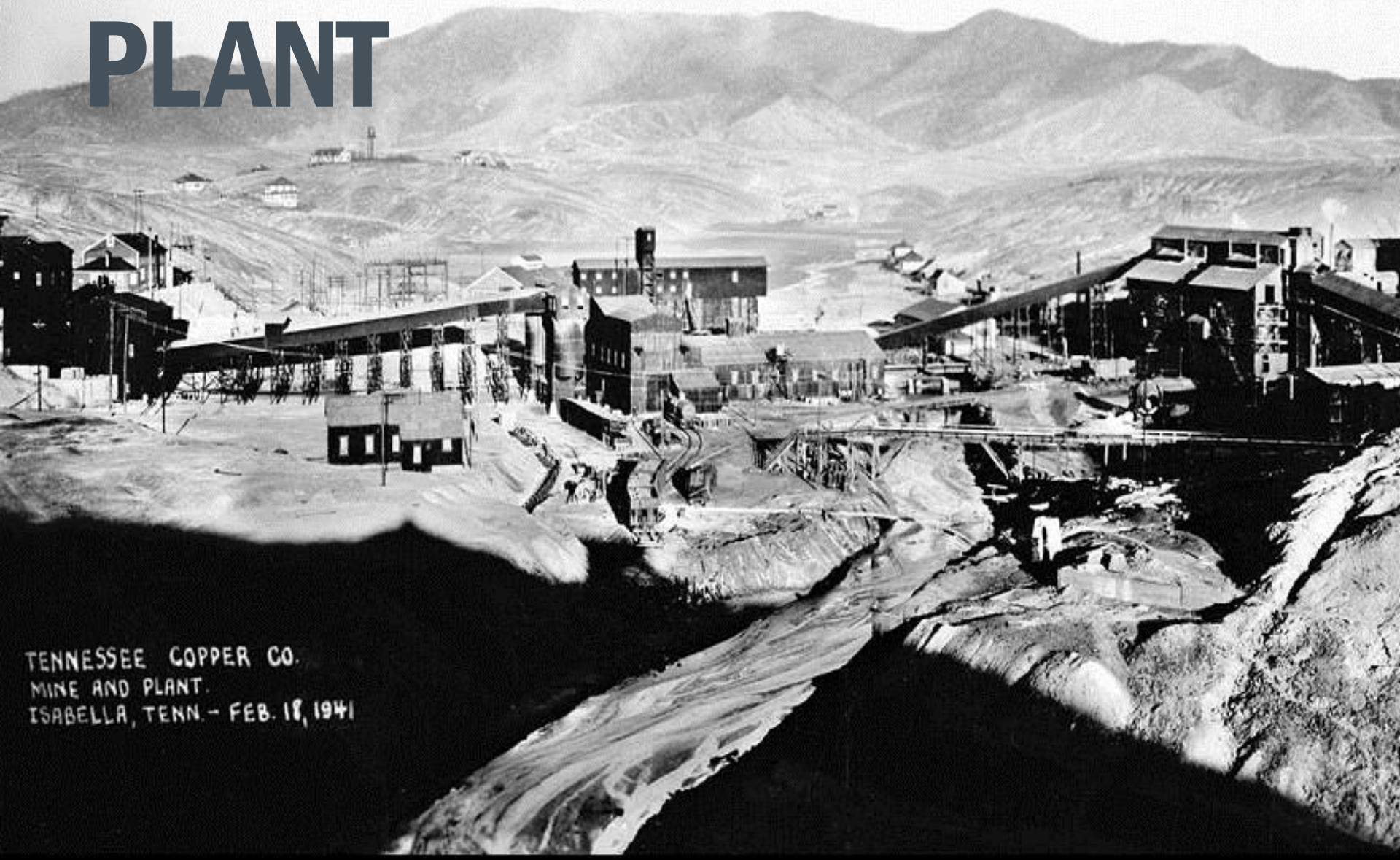
LONDON MILL







HISTORIC ISABELLA PLANT



TENNESSEE COPPER CO.
MINE AND PLANT.
ISABELLA, TENN. - FEB. 18, 1941



Eureka Roast Yard

West Bank
Soil Cap

North Potato Creek

Ellis Branch

Former Isabella
Plant Cap

Lead Chamber
Acid Plant Cap

Former Lead Chamber
Acid Plant

Ellis Branch Slag and Cap

Stansbury Road

WASTE REMOVAL AND CAPS AND VEGETATED COVERS AT ISABELLA PLANT SITE

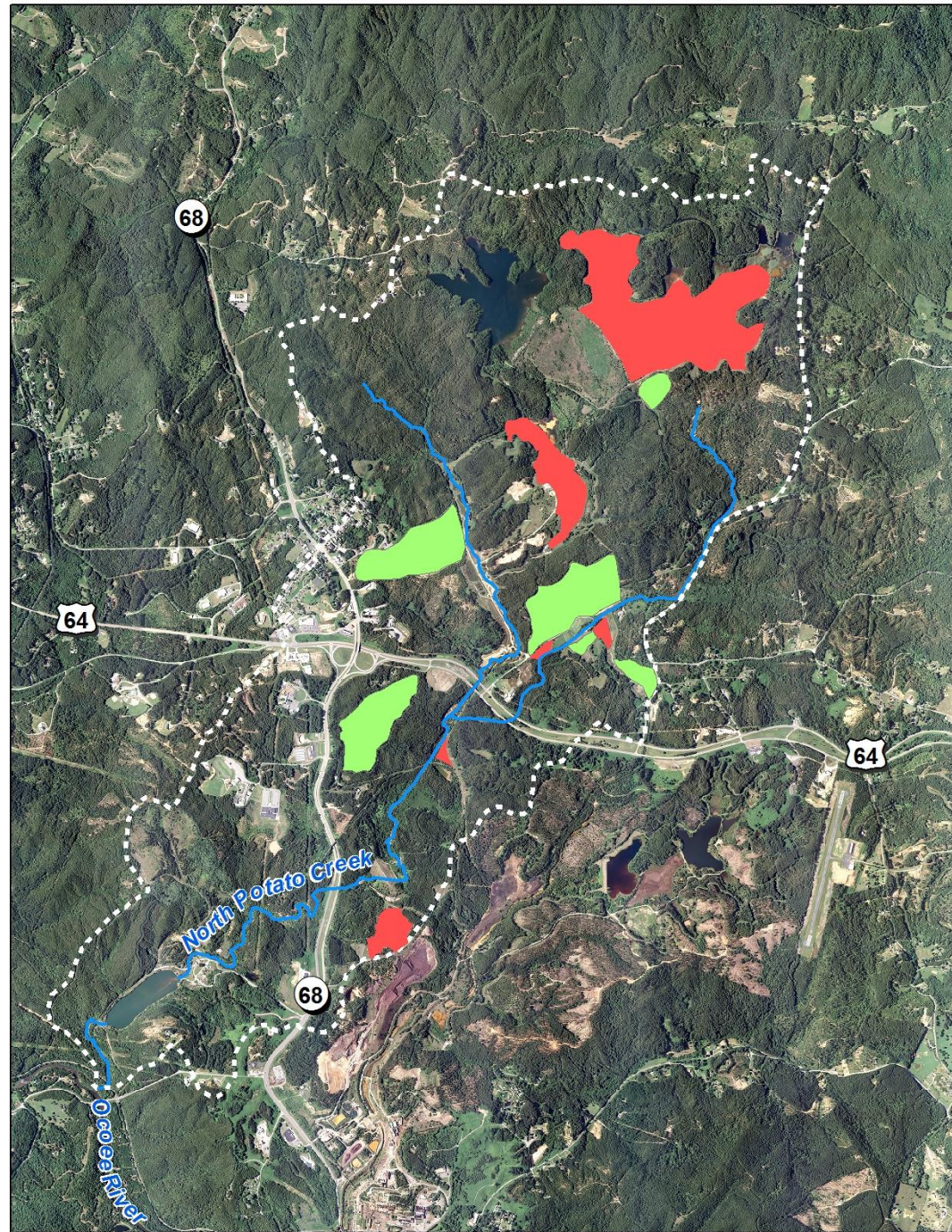




Legend

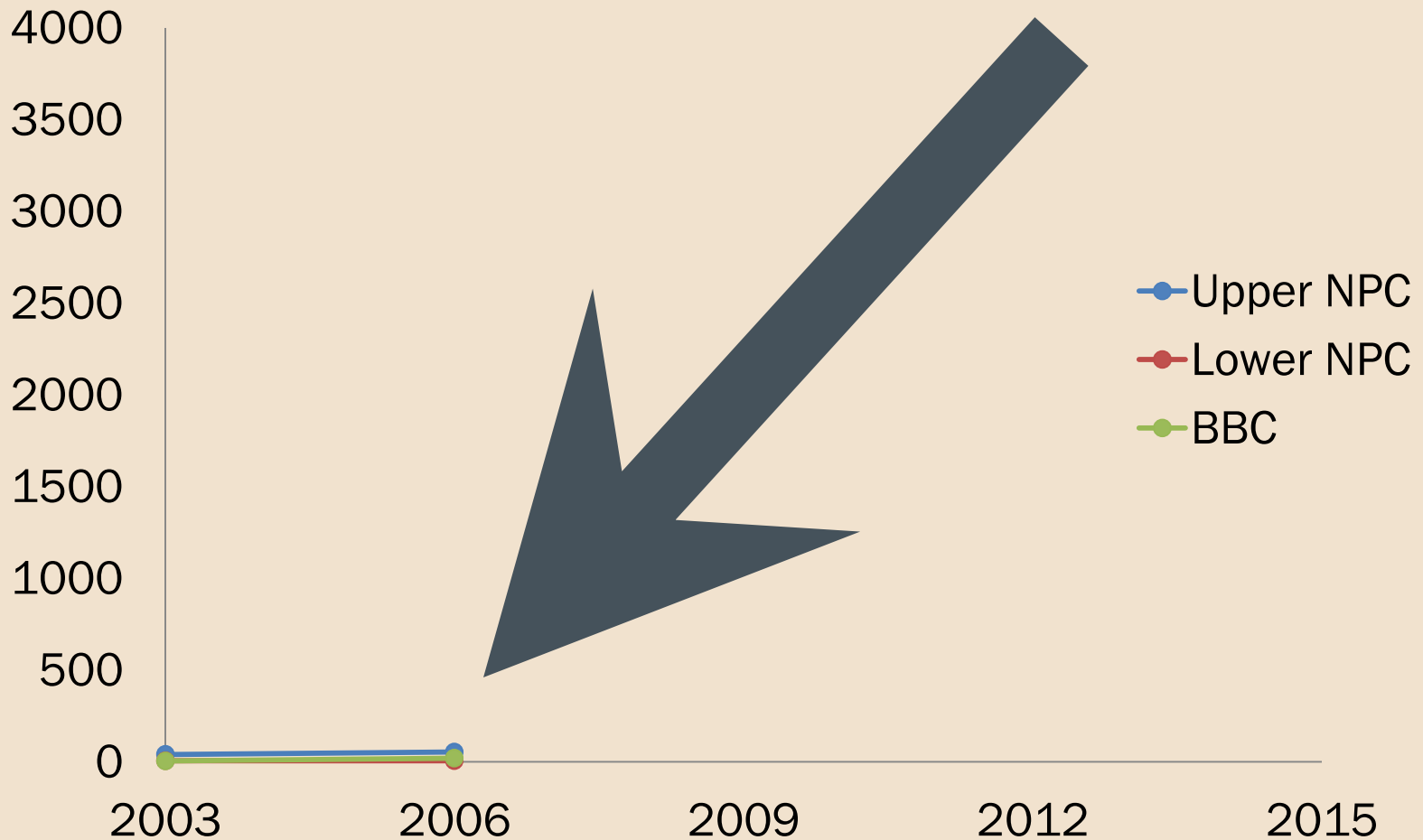
 Initial Actions

 Secondary Actions



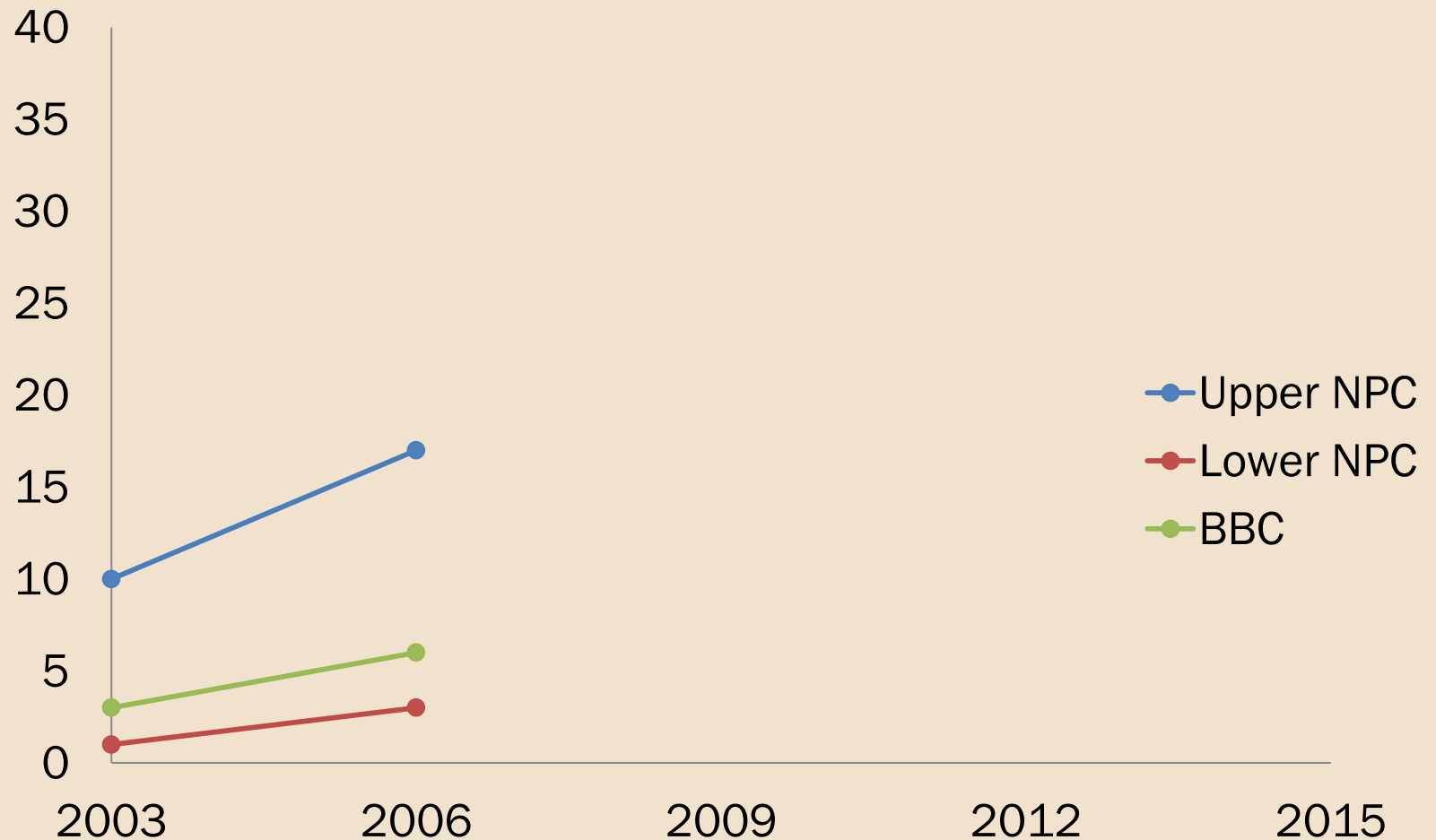
TOTAL ABUNDANCE 2006

Biomonitoring Results



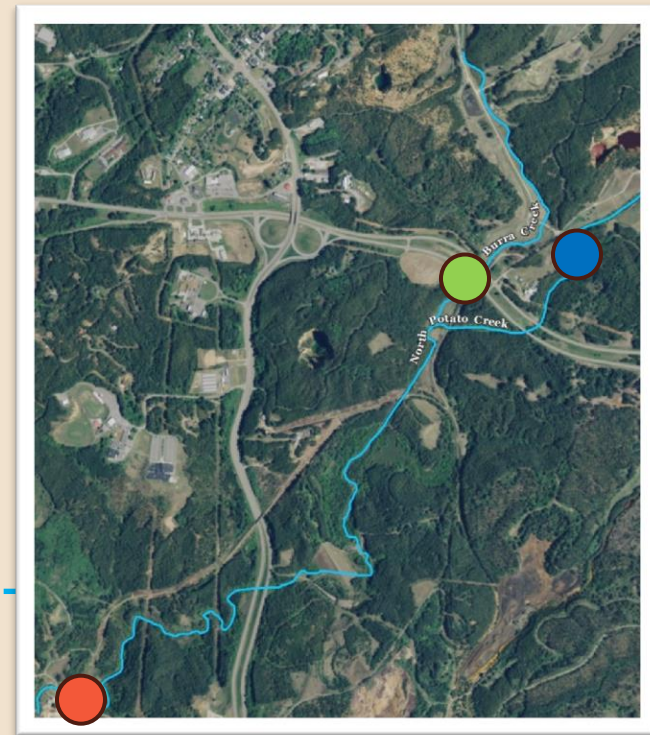
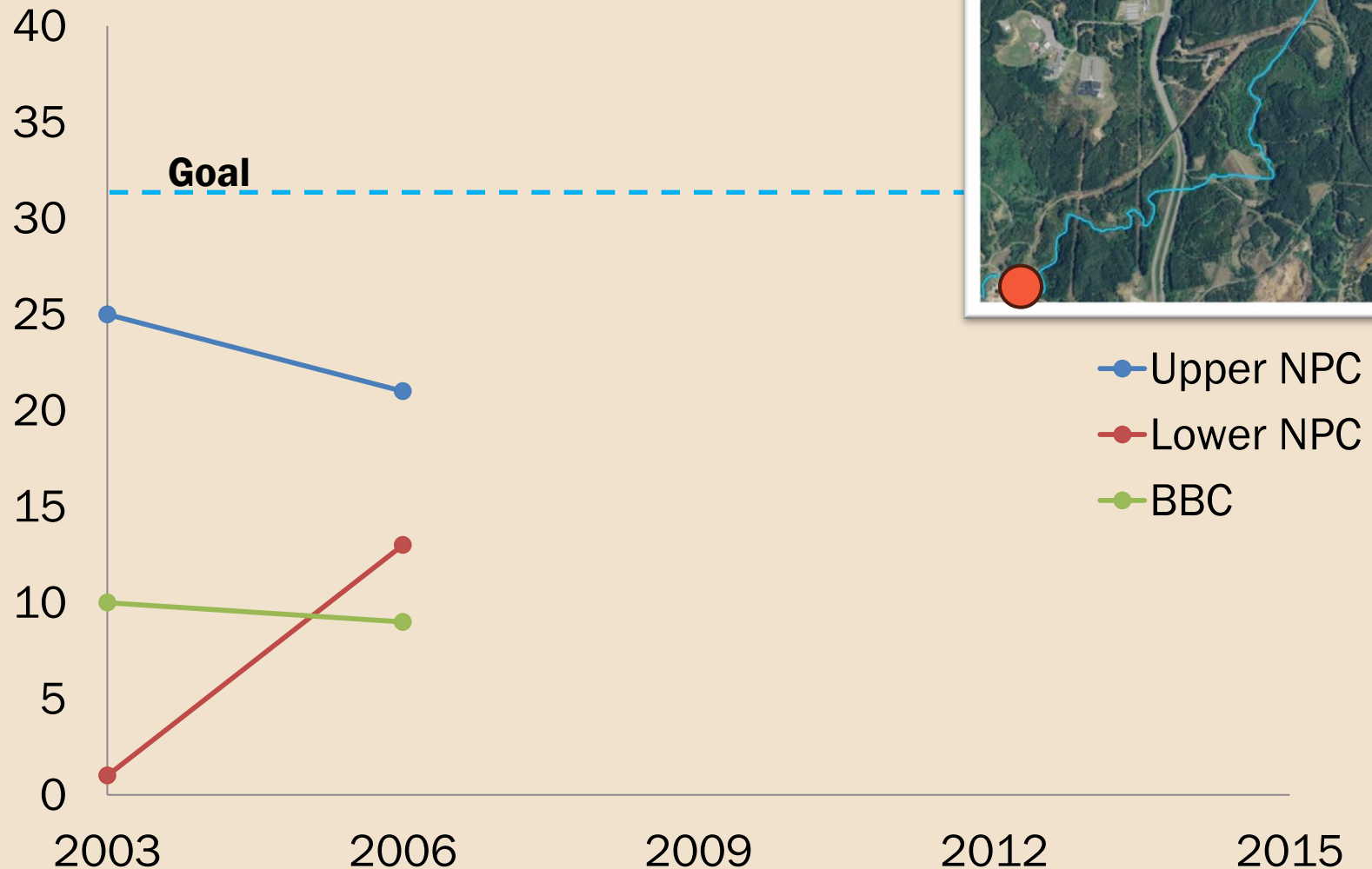
TAXA RICHNESS 2006

Biomonitoring Results



TMI SCORE 2006

Biomonitoring Results



TERTIARY ACTIONS

Small removal of sources of acid generation and metals and the reconstruction of impacted stream reaches

TERTIARY ACTIONS

Burra Burra Creek
Reconstruction

UT6A Grading and Surface-
Water Collection

BURRA BURRA CREEK RECONSTRUCTION









Burra Burra Creek Reconstruction

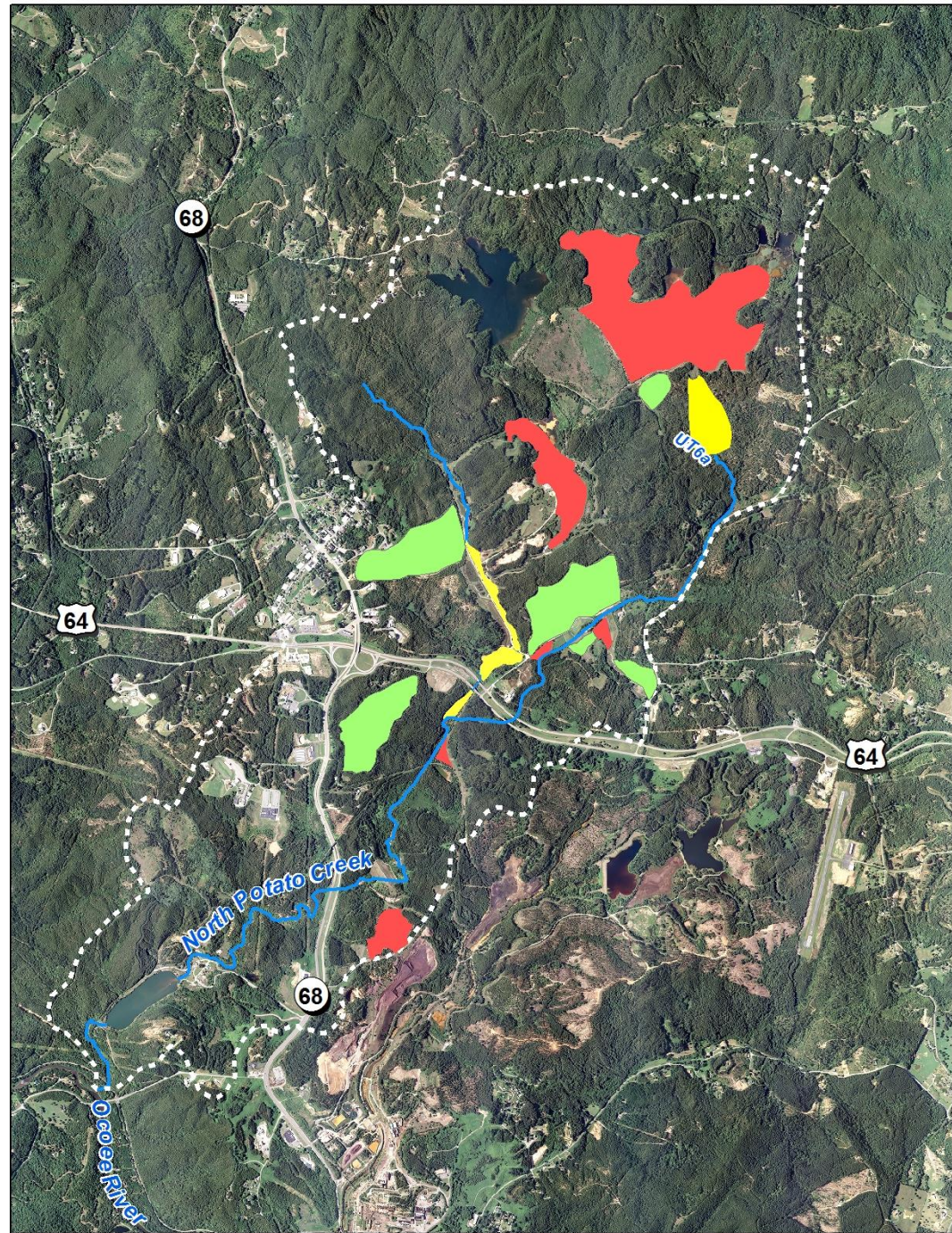


OCOEE MINE TRIBUTARY



Legend

-  Initial Actions
-  Secondary Action
-  Tertiary Actions



METRICS OF COMPLETED ACTIVITIES

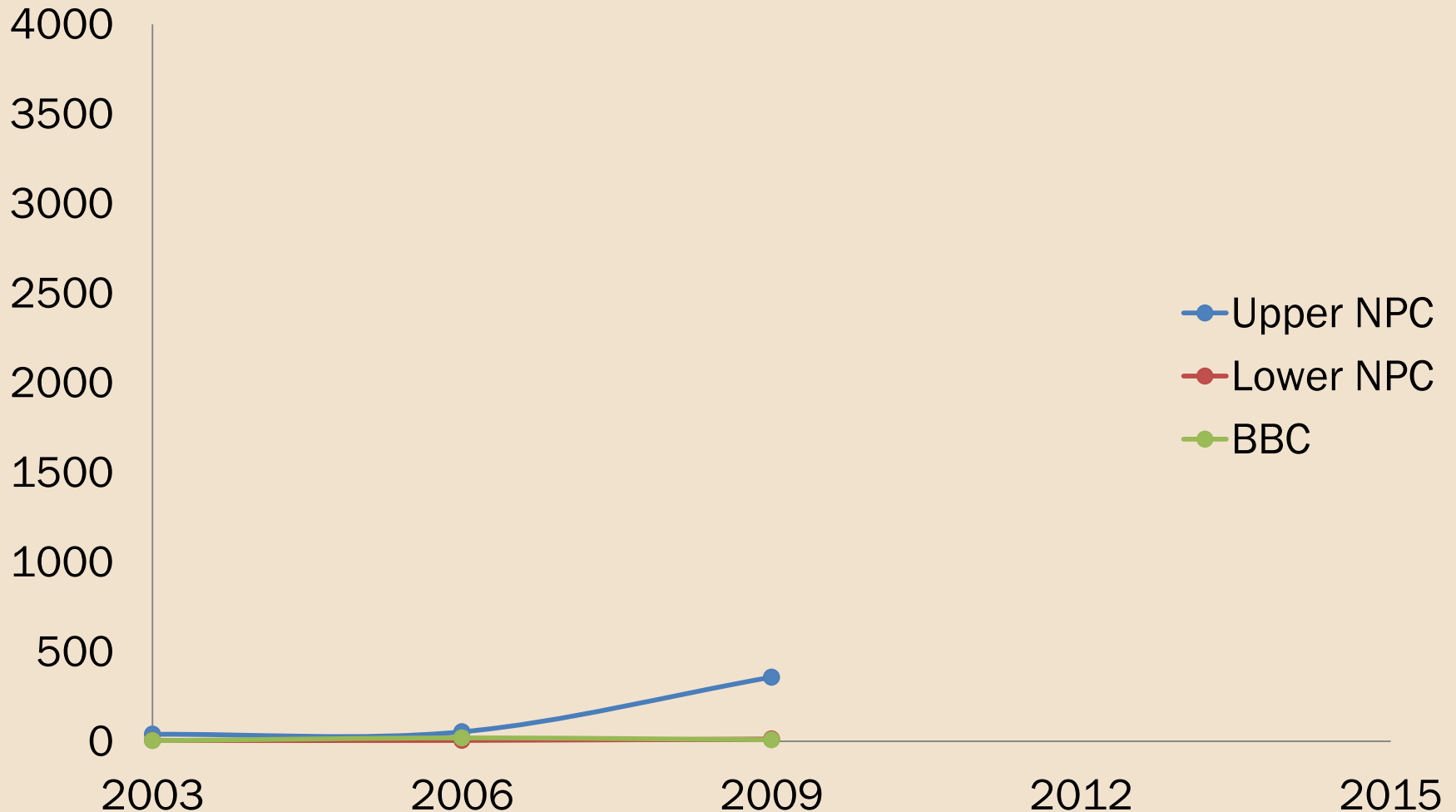
Stream Constructed:	4,300 feet
Surface/Subsurface Water Diversions:	42,340 feet
Wetlands Constructed:	3 acres
Stream Habitat Enhanced:	8,150
Waste Removed:	905,500 yd3
Waste Disposed in Isabella Pit:	656,800 yd3
Waste Capped:	22 acres
Waste Covered:	150 acres
Waste Disposed Off-Site:	785 tons
Asbestos Containing Material Removed:	430 yd3
Metals Removed through Treatment at NPCWTP:	560 lbs/day

METRICS OF COMPLETED ACTIVITIES

Acres Vegetated:	385 acres
Trees Planted:	419,000
Pounds of Seed:	29,130 lbs
Lime and Fertilizer Used:	8,815 tons
Pump Station Constructed:	4
Pipeline from BBC to SMP area:	13,000 feet
Subsurface Water Collected for Treatment:	1,000,000 gal/day (695 gal/min)
Water Treatment at SMP:	8,900,000 gal/day (6200 gal/min)

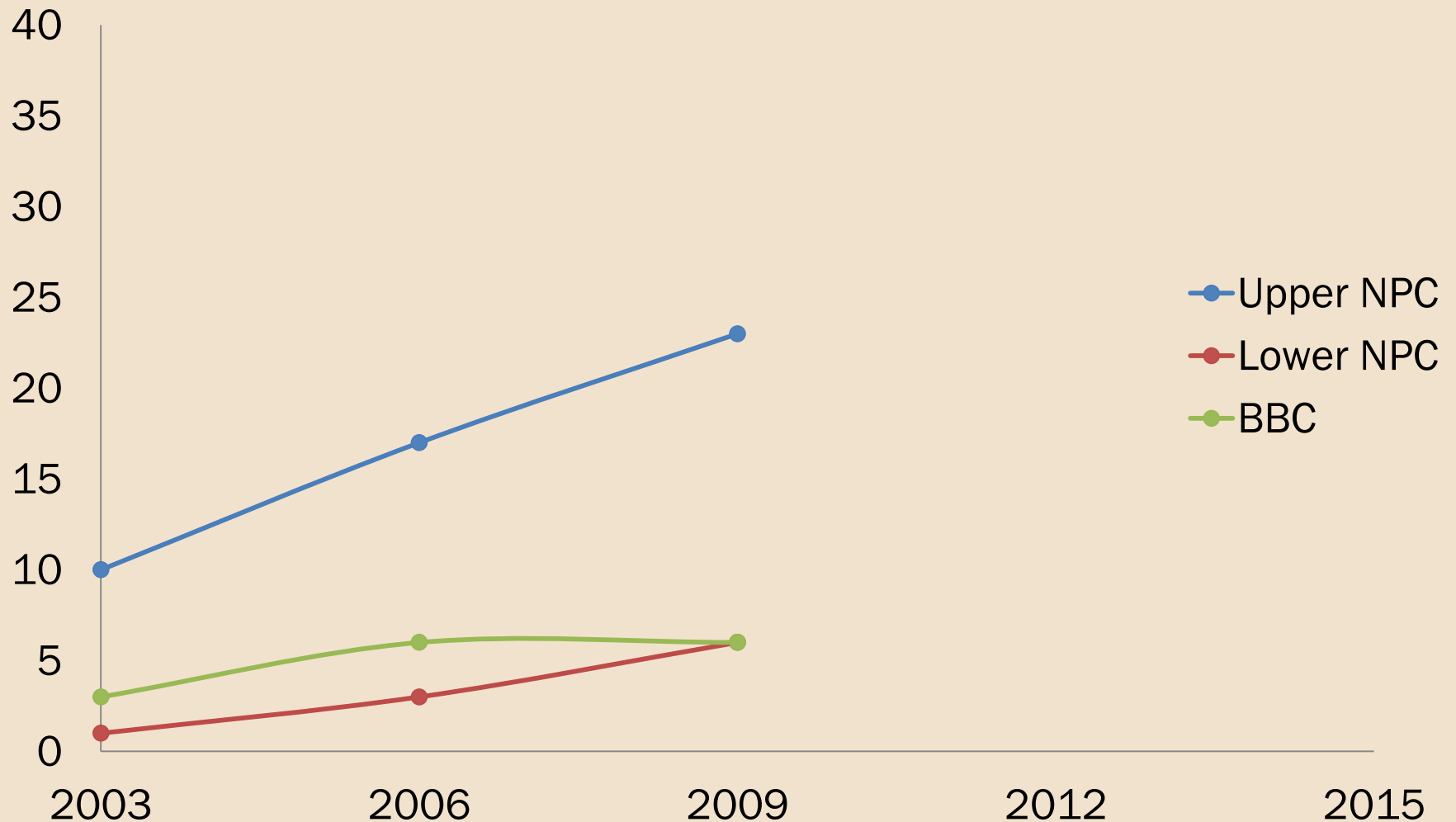
TOTAL ABUNDANCE 2009

Biomonitoring Results



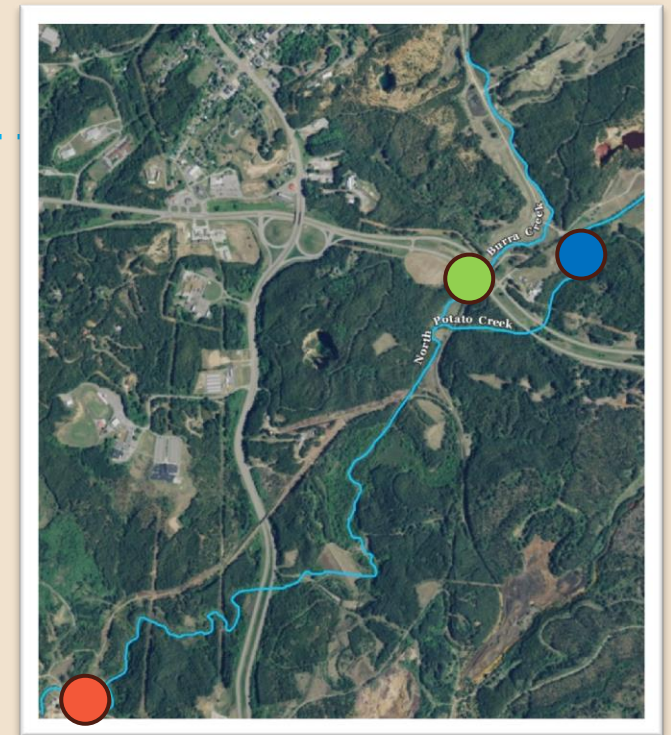
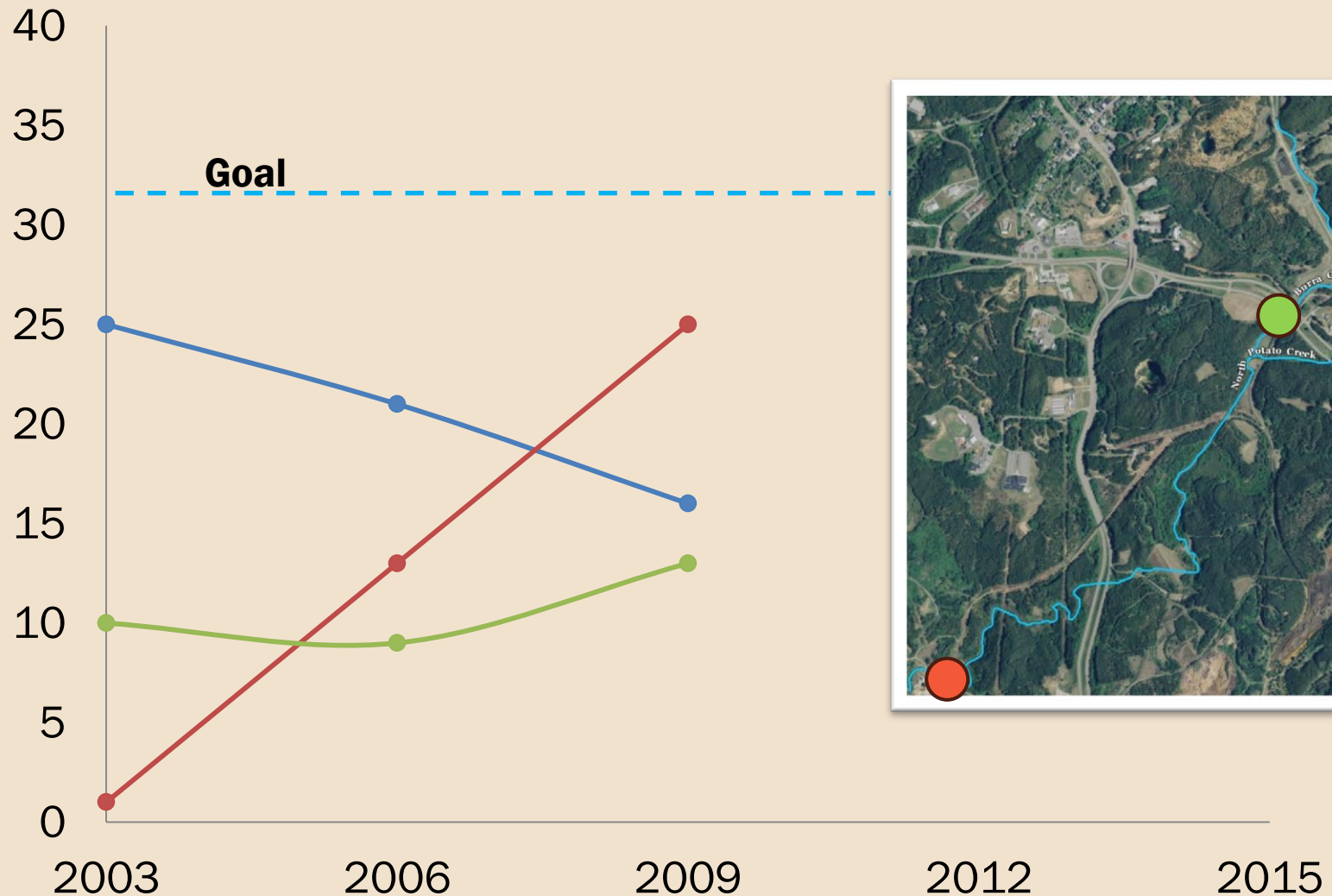
TAXA RICHNESS 2009

Biomonitoring Results



TMI SCORE 2009

Biomonitoring Results



FINAL REMEDIAL ACTIONS

Improvement of stream and stream bank habitats and the diversion of North Potato Creek around the South Mine Pit

HABITAT IMPROVEMENTS

Flow
Diversions
(Large)

Flow
Diversions
(Small)

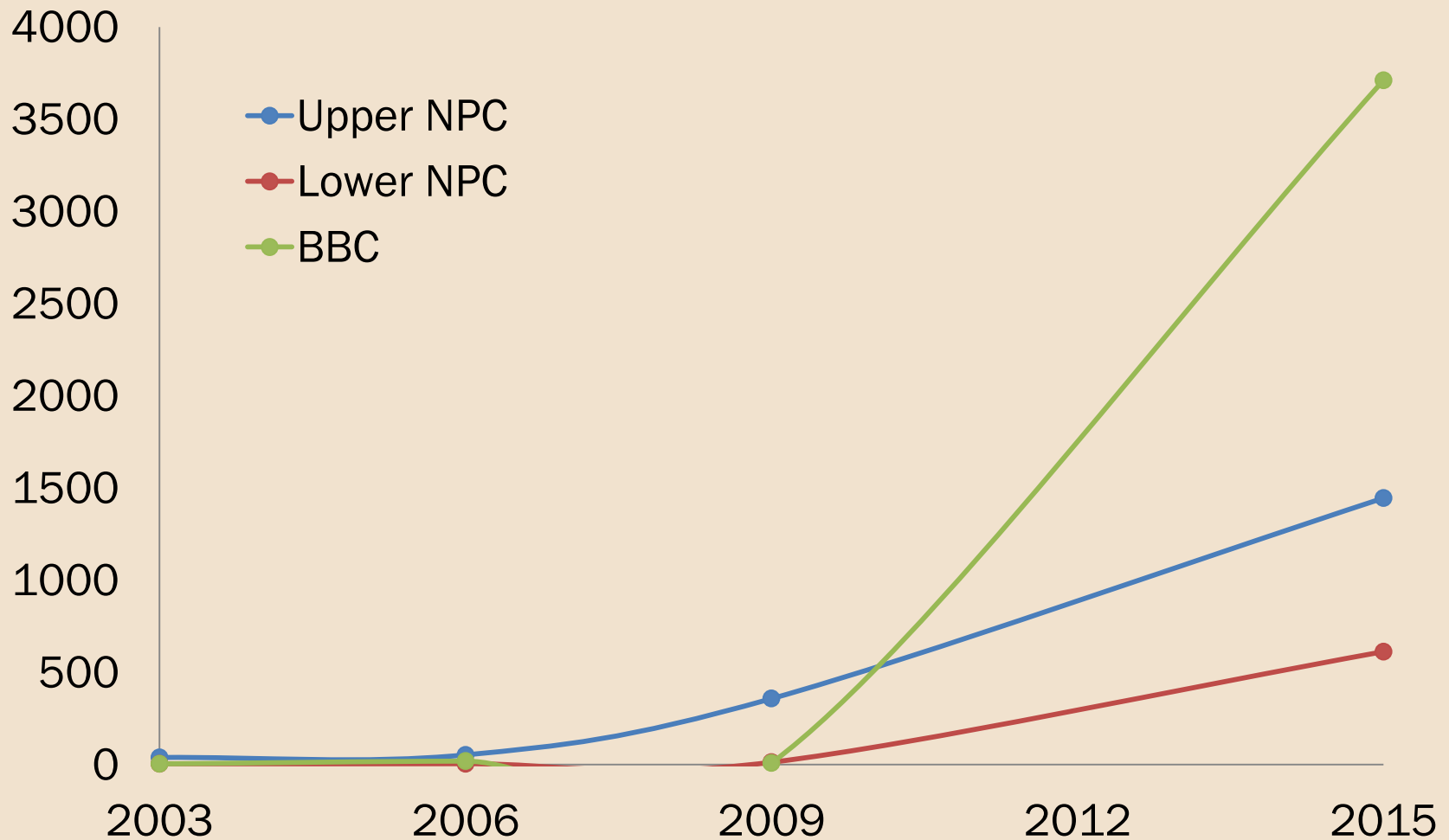
Stream Bank
Stabilization

Sediment
Deposition –
Log Veins



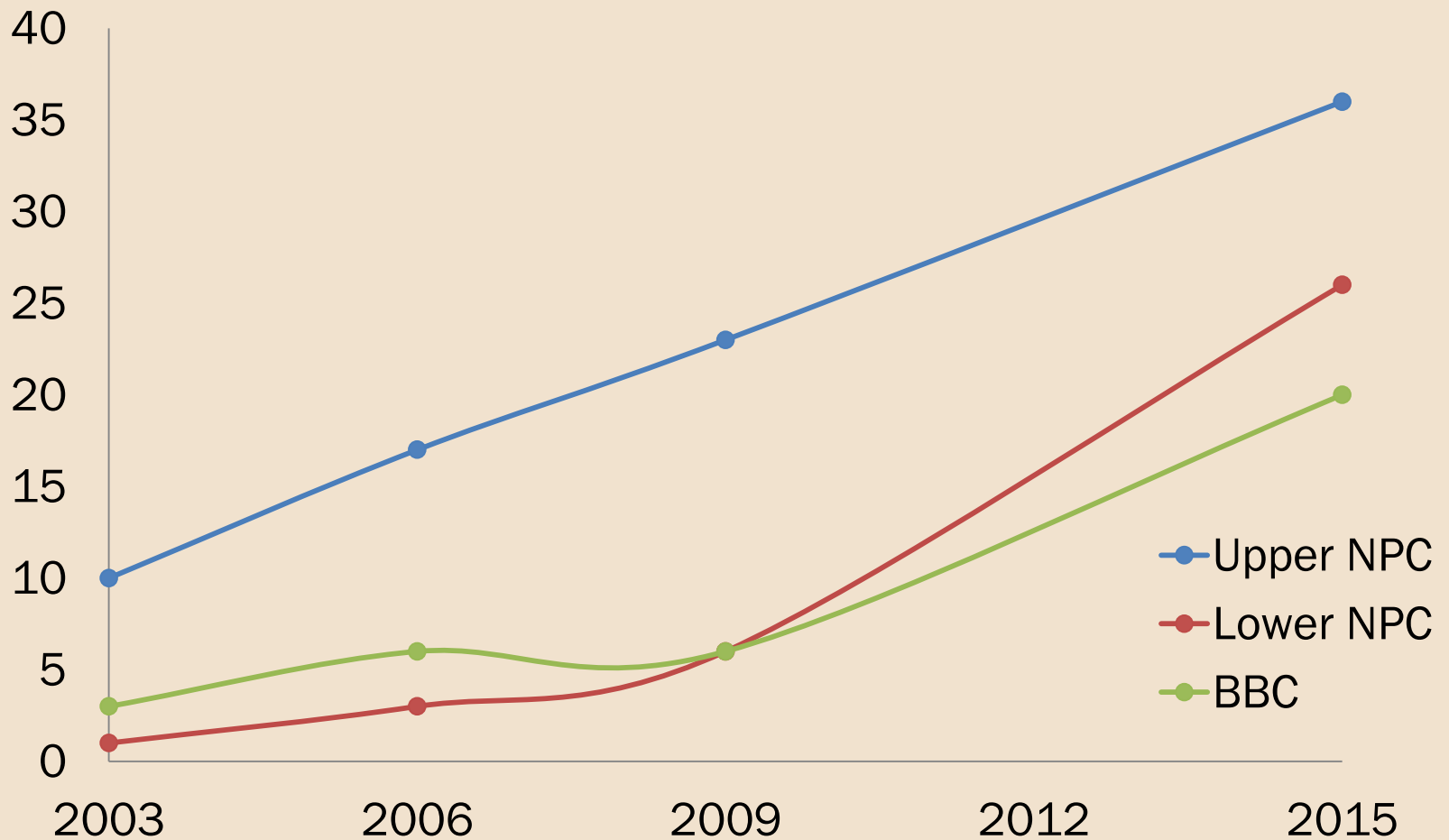
TOTAL ABUNDANCE 2015

Biomonitoring Results



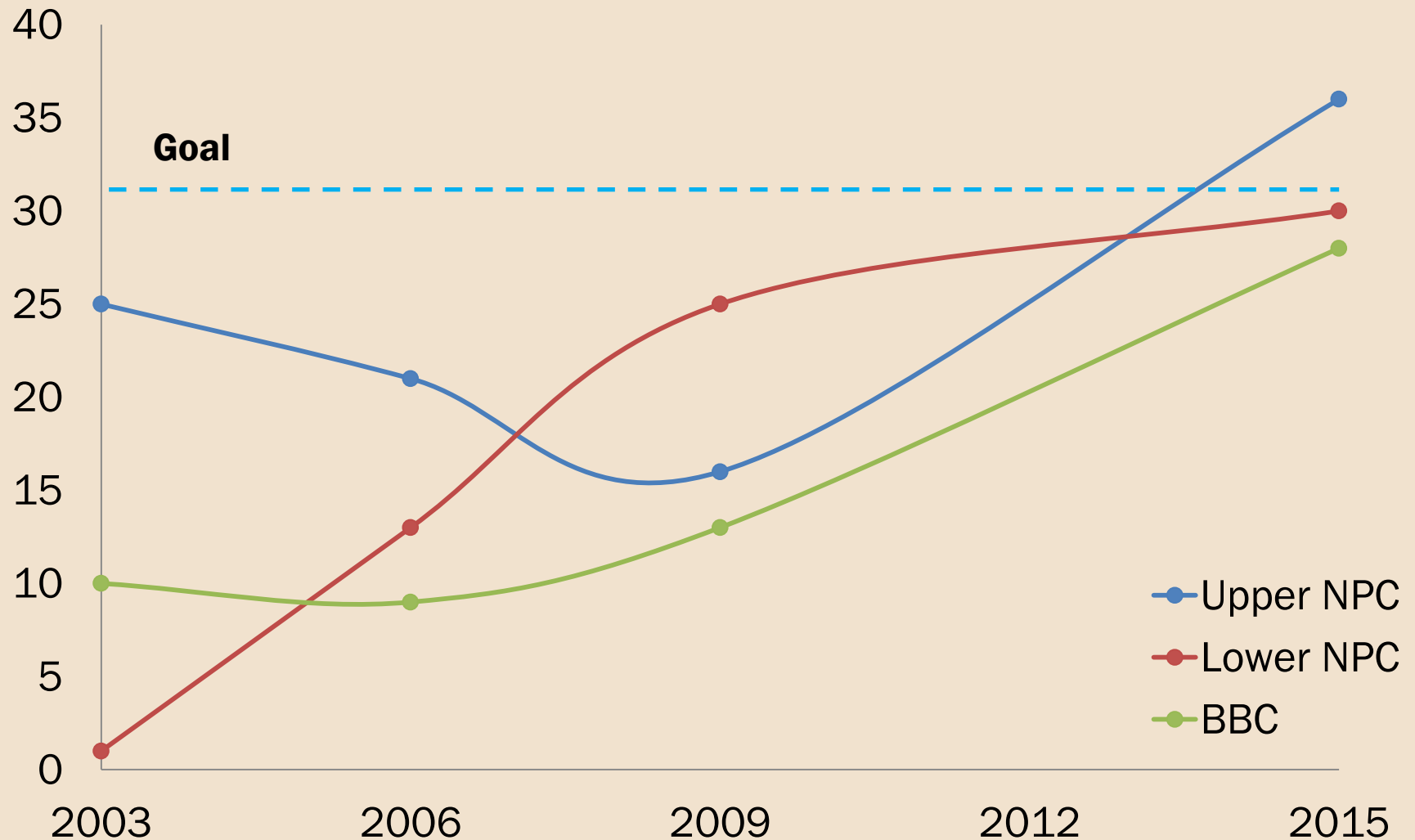
TAXA RICHNESS 2015

Biomonitoring Results



TMI SCORE 2015

Biomonitoring Results



NORTH POTATO CREEK

Average Reduction in Metals
Concentrations 2003 – 2013

Copper: 96%

Iron: 99%

Zinc: 81%

NORTH POTATO CREEK WATER TREATMENT PLANT AND BYPASS



THANK YOU

Tom McComb, PG, CPG, PMP

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